

ON THE PRESENT STATE OF KNOWLEDGE IN BACTERIAL  
SCIENCE IN ITS SURGICAL RELATIONS.

(Continued from page 57).

G. GONORRHOEA.

The discovery of the specific organism of gonorrhœa by *A. Neisser* in the year 1879<sup>1</sup> is one of those scientific achievements which have not as yet led to the practical therapeutical results which such a discovery might well have justified us in anticipating. Perhaps this is the chief reason why so many surgeons of the present time hesitate to include the *gonococcus*—as the organism in question has been designated, with more brevity than logic, by its discoverer—in their articles of medical faith. Our faith, however, varies with our understanding, and it is with the *gonococcus* somewhat as Bacon says, speaking of Atheism, “a little learning inclineth man's mind to doubt, but depth in philosophy again bringeth men's minds about to belief.”

The history of the development of the doctrine of the *gonococcus* is in point of fact somewhat singular. Discovered, as it was, comparatively long ago, and repeatedly and unexceptionally found in all well-marked cases, there is a very conspicuous lack of successful culture experiments and of reliable inoculation experiments, even at the present day. The reason for this is to be looked for, on the one hand, in the fact that producing pure cultures of the *gonococcus* on sterilized soils is a very difficult matter of performance; and, on the other hand, the germ is not one that easily proves infectious to animals, and there is a very natural reluctance on the part of experimenters to performing inoculations upon themselves or others, on account of the manifold dangerous complications so frequently attaching to the disease.

We possess only two reports of inoculation experiments that are

<sup>1</sup> Ueber eine der Gonorrhœe eigenthümliche micrococcus form. Vorläuf. Mittheilung. Centrabl. f. d. Med. Wiss. 1879. No. 28.

wholly satisfactory, the one by *Bockhardt*,<sup>1</sup> the other by *Bumm*.<sup>2</sup> Inoculation with cultures on the human subject, it is true, have been performed by others as well—among whom are to be mentioned Bókai, Chameron, Sternberg; but the first of these has published such incomplete accounts that they are not admissible for discussion, and the latter gentlemen, as well as Neisser himself and Oppenheim, were not successful in obtaining the pure culture of the true gonococcus, as Bumm has shown; so that their negative results lose all their power of conviction.

The germ itself—to begin with the author's own review of the subject<sup>3</sup>—is described by Neisser as a micrococcus, always appearing in couples as diplococcus; the single cocci are not perfectly spherical, but are flattened at one pole to such an extent that their shape resembles a segment of a sphere, and the whole appears not unlike a breakfast-roll. The single cocci turn their flattened poles towards each other, but a narrow space separates them, and there is no contact.

These diplococci multiply by bipartition each micrococcus becoming divided into two, so that groups of 4, 8, etc., are formed, but never chains. The halving process of each successive generation occurs in a line at right angles to that of the former generation. These groups of pairs are always to be found in connection with the pus-cells, and only when present in great numbers are single pairs found free in the serum.

They are always present in gonorrhœa, even in those cases of sixteen months standing, though they are not then so readily found; they are never present in other suppurations, but those of gonorrhœal origin. They are, moreover, usually the only ones present in gonorrhœal discharge.

The presence of these peculiar organisms in gonorrhœa was soon corroborated after Neisser's communication by numerous observers.

<sup>1</sup> *M. Bockhardt*, Beitrag zur Ätiologie und Pathologie des Harnröhrentrippers. Vierteljahrsschr. f. Dermatol. u. Syph. 1883. p. 3. Sitzungsher. d. phys. med. Ges. z. Würzburg. Sept. 1882.

<sup>2</sup> Der Mikro-Organismus der gonorrh. Schleimhauerkrankung. Wiesbaden. 1885. J. F. Bergmann.

<sup>3</sup> Die Micrococcen der Gonorrhœe. Referierende Mittheilung. Deutsch. Med. Wochenschrift. 1882. P. 279. 13. May.

Bókai, Weiss, Aufrecht, Ehrlich, Brieger, Gaffky, were among the first to publish assenting statements, and ophthalmologists, such as Sattler; Leber, Haab, Hirschberg and others very soon testified to the occurrence of the germ in gonorrhœal conjunctivitis. Bockhardt found them present in 258 cases of gonorrhœa, in 14 cases of vaginal blennorrhœa, in 2 cases of suppurative cervical catarrh, etc. More recently Lundström<sup>1</sup> found them in all of the fifty cases he examined, one of which was of two years standing—and every clinical student has since been able to satisfy himself of their presence.

The staining is best done with methylene blue; the use of well-colored preparations and of Abbé's lens is indispensable in examining the purulent secretions, which should be dried onto cover-glasses in a thin layer and affixed to them by direct heat.

It would, however, be erroneous to suppose that the shape of these diplococci is the main characteristic point in diagnosis. According to Bumm there are no less than seven different species of diplococci which present the same shape in appearance and grouping as the specific gonococcus. These, however can easily be distinguished from the gonococcus by means of culture experiments, since none of them grow in the same manner on the soils.

On the contrary the main differentiating feature of the gonococcus is its situation inside of its cell, the lodgment in the protoplasm, and its further development beneath the surface of the leucocyte. This ability on the part of the micro-organism to penetrate into the substance of the cells is no doubt the main reason why the proposed abortive methods of treatment of gonorrhœa have proved so little successful.

According to Bumm, who had the opportunity of microscopically examining twenty-six cases of ophthalmal blennorrhœa of infants—a gonorrhœal disease acquired from the mother through contagion during parturition<sup>2</sup>—the germs actively penetrate into the mucous membrane, entering between the epithelial cells, and advancing so far as the

<sup>1</sup> Studier öfver Gonococcus. Diss. Helsingfors. 1885.

<sup>2</sup> O. Haab, Der Micrococcus der Blennorrhœa Neonatorum. Festschrift. Wiesbaden. 1881. Correspond. f. Schweizer Aertze. 1881. 3, 4.

papillary body of the mucous membrane, all the while increasing in numbers.

In consequence of this invasion leucocytes appear in great quantities, suppuration ensues, the epithelium becomes partly elevated and detached, and eventually fibrinous exudation takes place.

The whole process in time comes to a end, partly because the micro-organisms penetrate no deeper than the papillary body, and probably also for the reason that the nutritive soil-substance of the parts becomes exhausted. The leucocytes then simply convey the micro-organisms to the surface, and, together with the epithelial cells, assist in rebuilding the destroyed tissues.

Bockhardt<sup>1</sup> has furnished a report of microscopical examinations of gonorrhœal inflammation of the urethral mucous membrane. Having procured a pure culture of the gonococcus in the fourth generation from Fehlcisen, he inoculated a patient suffering from general paralysis of the insane by urethral injection of a quantity of the pure culture, and observed the development of a typical gonorrhœa after three days. On the tenth day the patient chanced to die in a paroxysm and the autopsy revealed the following conditions. There was abscess of the right kidney, hyperæmia of the mucous membrane of the bladder with necrosis of minute portions; the mucous surface of the urethra was covered for a distance of 6 centimetres from the cutaneous orifice with viscous bloody exudate; the corpus cavernosum of the urethra was swollen.

The secretions of the mucous membranes as well as the kidney fluid contained the specific cocci, which were also found enclosed in the substance of the white blood-corpuscles in the mucous and sub-mucous tissue of the urethra.

The lymph-spaces and ducts furthermore contained micrococci, and some were observed inside of the white blood-corpuscles in the capillaries.

These anatomical data make it easily conceivable why it is that true gonorrhœa presents so extended a course, and the microscopical examination consequently admits of a differentiation between true gon-

<sup>1</sup>l. c.

orrhœa and a non-specific urethritis, as well as of a prognosis as to the time of duration, just as, conversely, a urethritis which runs its course in a few days, permits the conclusion that it is not due to the gonococcus. In some of the European clinics, notably at Würzburg, no case of gonorrhœa is diagnosed, until the gonococcus has been found. The presence of the specific germ is also of vast practical importance in the diagnostic estimation of gynecological cases—nor is any great amount of skill or time required for such examinations, which may even be effected before the patient leaves the examining chair.

Inoculations of gonorrhœal pus itself, containing diplococci, have frequently enough been observed to call forth the specific disease. Every practitioner has opportunities of witnessing inoculation experiments on the conjunctiva in his daily practice, and the earnestness with which surgeons warn their patients of the dangers of such inoculations is the best argument in favor of the gonococcus.

Detailed accounts of such inoculations have been published by Welander,<sup>1</sup> who gives three cases of successful inoculation, and so-called control-cases, in which inoculation with pus not containing the organisms caused no inflammation.

Bunum has also shown that gonorrhœal secretion which is free from micrococci does not produce gonorrhœal inflammation. All of which tends to show that it is in point of fact the gonococcus which is the true cause of contagion.

Anatomically the gonococcus has been demonstrated up to the present time in gonorrhœal affections of the male and female urethra, the bladder, the kidneys,<sup>2</sup> in peri-urethral abscess,<sup>3</sup> in gonorrhœal bubo,<sup>4</sup> in gonorrhœal gonitis,<sup>5</sup> in gonorrhœal affections of the rec-

<sup>1</sup> Quelques recherches sur les microbes pathogènes de la blennorrhagie. *Gazette Médicale*. 1884, p. 267. *Nord. Med. Arch.* Vol. XVI. No. 2.

<sup>2</sup> Bockhardt, l. c.

<sup>3</sup> Welander, l. c.

<sup>4</sup> M. Wolff.

<sup>5</sup> Kammler, Ueber gonorrh. Gelenkentzündung. *Centralbl. f. Chir.* 1884. No. 4.  
M. Petroni. Sulla natura dell'artrite blennorrhagica. *Rivista Chir.* 1883. No. 2.

tum<sup>1</sup> of the uterus, in certain abscesses of Bartolini's glands,<sup>2</sup> and in gonorrhæal conjunctivitis, although in the latter affections other micro-organisms are frequently present as well.

As regards the cultivation of the germ, reliable cultures appear to have been achieved by Bumm, whose statements in this regard agree with Krause, Leistikow and Löffler, the cultures by other experimenters being more or less open to objection.

The gonococcus, it appears, can only be cultivated on blood-serum soils, where it develops as a very fine, scarcely perceptible film of greyish-yellow color, when viewed in direct light. The surface of the colony appears smooth and moist; its margins appear gradually diffused into the surrounding parts; the serum soil does not become liquefied. The gonococci appear in groups, developing in close proximity to each other.

The cultures thrive best at a temperature of 30° to 34° C. in a moist atmosphere. Temperatures above 38° C. destroy the cultures. The growth progresses very slowly; and to obtain good cultures it is advisable to inoculate fresh soils after the first colony has developed for a period of 24 hours.

With such a pure culture as this Bumm performed his inoculation experiment, which, even if it is only a single one, still commands attention, since it answers every bacteriological requisition.

He introduced a minimal quantity of the pure culture into the urethra of a healthy woman, and shortly after was able to observe the development of a specific gonorrhœa.

Considering the difficulty apparently attendant upon the procuring of pure cultures and the scientific scruples connected with the inoculation experiments on the human body, there appears to be no reason for not accepting the evidence contained in the two inoculation experiments above described, nor for not according the gonococcus equal dignity with the tubercle-bacillus and the micro-organisms of suppuration.

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<sup>1</sup> Bumm, *Archiv. f. Gynæcol.* 3, p. 339.

<sup>2</sup> Bumm, l. c. E. Arning, Ueber das Vorkommen von Gonococcen bei Bartolinittis. *Viertel jarschrift f. Dermat. u. Syph.* 1883, p. 371.